symptoms. This study addressed whether pacing is useful to decrease the severity of MR.

Methods: We performed a retrospective analysis on 15 patients with HOCM who received dual chamber pacing for drug refractory symptoms. The AV delay was optimized to give the greatest reduction in LVOT gradient while ensuring the ventricles were optimally pre-excited. MR was assessed by Color Doppler performed before and after (mean:5.6 ± 0.9 months) pacemaker insertion.

Results: Twenty percent of patients had no MR, 47 percent had mild MR and 33 percent had moderate or severe MR. Dual chamber pacing resulted in improvement in MR in 75 percent of patients with moderate or severe MR and the improvement correlated directly with the reduction in LVOT gradient ($r = 0.963$; $p = 0.037$). There was no change in patients with mild MR.

Conclusion: Dual chamber pacing lessens the severity of MR in patients with HOCM and moderate or severe MR and this improvement is directly related to the reduction in LVOT gradient.

1011-28 Identification of Patients Requiring DDD-Pacemaker After Percutaneous Transluminal Septal Myocardial Ablation in Hypertrophic Obstructive Cardiomyopathy

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Background: Alteration of the infra-His bundle branches is a major complication of percutaneous transluminal septal myocardial ablation (PTSMA) in HOCM that mandates early and reliable identification of those pts. at risk for permanent complete heart block (CHB).

Methods: We analyzed the hospital course of 83 pts. after PTSMA. Restoration of stable AV-conduction lasted up to 11 days in 1 pt.; 1 pt. suffered from syncope due to CHB 9 days after PTSMA. We compared several clinical and electrocardiographic characteristics of pts. with and without need of DDD-pacemaker (PM).

Results: 11 (13%) pts. required a DDD-PM after PTSMA (Group I), in 72 pts. a stable AV-conduction could be observed (Group II).

	Group I	Group II	p
CHB during PTSMA (%)	100	58	0.03
CHB at ICU arrival (%)	91	33	0.001
AV-conduction at 12 hrs (%)	64	76	0.0005
AV-conduction at 48 hrs (%)	9	83	0.0001
QRS time at 48 hrs (msec)	171 ± 16	138 ± 25	0.0001
GOT peak (hrs after PTSMA)	18.2 ± 3.7	13.6 ± 5.1	0.0005

From the data available after 48 hours in the first 33 pts. a score was calculated that identified the first 7 pts. who need a DDD-PM after PTSMA. Afterwards all PM pts. were prospectively identified.

Conclusions: Based on careful 48-hours follow-up identification of pts. prone to permanent CHB seems to be possible. Further prospective validation of the score will add to safety of PTSMA.

1012 Mitral Balloon Valvulotomy: Surgical Repair

Sunday, March 29, 1998, 5:00 p.m.–7:00 p.m.
Georgia World Congress Center, West Exhibit Hall Level
Presentation Hour: 5:00 p.m.–7:00 p.m.

1012-18 Is it Possible to Perform Valve Repair for Severe Mitral Regurgitation After Percutaneous Mitral Commissurotomy?

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Background: Severe mitral regurgitation (MR) following percutaneous mitral commissurotomy (PMC) generally requires surgery, but conservative surgery has been reported in only a few cases. The aim of this study was to test the feasibility of valve repair for severe MR after PMC, and the quality of this repair.

Methods: Of 1514 patients (pts) who underwent PMC in our department between 1986 and 1995, 51 (3.4%) had severe MR (≥Sellers' grade 3) following the procedure. Mitral surgery was performed in 47 pts and valve repair was judged feasible in 23 on the following criteria: non-calcified valves, absence of complete papillary muscle rupture, and age <60 years. The mechanisms of MR, either singly or in combination, were a paracommissural tear in 9 pts (39%), a median leaflet tear in 10 (43%), excessive commissural opening in 1 (4%), a partial papillary muscle rupture in 2 (9%), and chordal rupture in 5 (22%).

Results: Surgery was performed by an experienced team in the first 24 hours after PMC in 3 pts, between day 1 and 30 in 15 pts, and after the first month in 5. In 4 cases, valve replacement was necessary because of severe subvalvular disease which had been underestimated by echography. Mitral valve repair was performed in 19 pts and combined commissurotomy in all pts with suture of a leaflet tear in 13, use of a pericardial patch in 6, and annuloplasty in 3. After valve repair, mean valve area was 1.9 ± 0.2 cm^2 and mitral regurgitation was present in 14 pts: grade 1 in 10, grade 2 in 4. No patient required reoperation.

Conclusion: Valve repair may frequently be performed for severe MR after PMC, with good immediate results, provided surgery is performed by an experienced team in patients selected by echocardiographic findings.

1012-19 The Role of age on Early and Late Prognosis of Percutaneous Mitral Balloon Valvulotomy in Rheumatic Mitral Stenosis

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The early and late prognosis of percutaneous mitral balloon valvulotomy (MBV) in younger age group of patients with rheumatic mitral stenosis was investigated. The study group consisted of 322 patients with echo score <9. In Group A (age ≤35 years) there were 170 patients, and in Group B (age >35 years) 152 patients. Successful MBV is defined as an increase of at least 25% of initial mitral valve area (MVA) or a post-MBV MVA of ≥1.5 cm^2, restenosis is defined as a 50% reduction of the increase obtained by MBV. In Group A, there were more women (85.8% vs 77.6%, p >0.05) and more patients had sinus rhythm prior to MBV (89.4% vs 59.1%, p <0.005). Pre-MBV, left atrial size, pulmonary artery pressure and diastolic mitral gradient were similar in both groups, whereas MVA was higher in Group A (1.08 ± 0.26 cm^2 vs 1.01 ± 0.26 cm^2, p = 0.025). The early increase in MVA (1.93 ± 0.28 cm^2 vs 1.9 ± 0.25 cm^2) and decrease in diastolic mitral gradient (18.7 to 6.7 mmHg vs 19.3 to 7.1 mmHg) were not different between Group A and Group B. The failure rate of MBV was 5.88% in Group A and 5.26% in Group B, and the difference was not significant. The MVA at 1st, 2nd and 4th year was similar in both groups. In Group A 1st, 2nd and 4th year restenosis rates were 5.26%, 13.9% and 15%, and 3.7%, 5.4% and 15.7% in Group B respectively, and the difference was not significant.

Conclusion: The early and late prognosis of MBV was not different in patients of relatively younger age, despite the better MVA and higher rate of sinus rhythm in this group prior to MBV. MBV is an effective mode of therapy in patients with rheumatic mitral stenosis and the outcome is independent of age, rhythm and MVA at the time of the procedure.

1012-20 Immediate and Long Term Outcome of Percutaneous Mitral Balloon Valvotomy in Patients With Mitral Stenosis and Atrial Fibrillation

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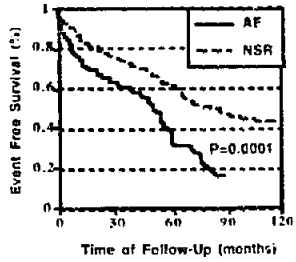
We compared the immediate and long term outcomes of percutaneous mitral balloon valvotomy (PMV) in 379 pts in atrial fibrillation (AF) with those of 355 pts in normal sinus rhythm (NSR). Patients in AF were older (62 ± 12 vs. 48 ± 14, p <0.0001) and presented more frequently with NYHA class IV (18.3 vs. 7.9%, p <0.0001), echocardiographic (Echo Sc) >8 (40.1 vs. 25.1%, p <0.0001), calcified valves under fluoroscopy (32.4 vs. 18.8%; p <0.0001) and with a history of previous surgical commissurotomy (21.7 vs. 16.4%, p = 0.0002). In patients with AF PMV resulted in inferior immediate and long term outcomes as reflected in a smaller post-PMV mitral valve area (1.7 ± 0.7 vs. 2.0 ± 0.7 cm^2, p <0.0001) and a lower event free survival (freedom from death, redo-PMV and mitral valve surgery) at a median follow-up of 61 months (32 vs. 61%; p <0.0001). In the AF group logistic regression identified post-PMV mitral regurgitation >3+ (p = 0.0001), Echo Sc >8 (p =



0.005) and pre-PMV NYHA class IV (p = 0.05) as independent predictors of combined events at follow-up.

Conclusions: 1) Pts in AF have clinical and morphologic features associated with inferior results after PMV. 2) In pts in AF, PMV results in worse immediate and long term outcomes.

1012-21 Commissural Prolapse: A Marker of Severity for Mitral Valve Repair

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Commissural anatomy has significant impact on the outcome of percutaneous mitral commissurotomy, but it has not been demonstrated for mitral valve (MV) repair. The aim of this study was, therefore, to evaluate the clinical characteristics and therapeutic implications of mitral regurgitation (MR) due to commissural lesions. Out of 269 consecutive patients (pts) who underwent MV repair for severe MR in the same institution, we selected a homogeneous subgroup of 190 pts with MV prolapse (MVP): 40 (gr.1) had a commissural prolapse, 72 (gr.2) had extensive prolapse without commissural involvement and 78 (gr.3) had a prolapse localised to the medial portion of posterior leaflet. There was no difference between the 3 groups as regards gender, NYHA class, cardiac rhythm and left ventricular function. Endocarditis was more often the cause of MR in gr. 1 (38%) than in gr.2 and 3 (18 and 19%, p < 0.001). Complex repair comprising 3 or more procedures was more often performed in gr.1 (83%) and gr.2 (67%) than gr.3 (5%) (p < 0.02), resulting in a significantly longer mean cross clamp time (75 and 67 mn vs 19 mn, p < 0.001). Postoperative echocardiographic evaluation showed significant residual MR resulting in reoperation in 13% of pts in gr.1, 1.4% in gr.2 and 2.5% in gr.3 (p < 0.13).

Conclusion: Commissural lesions 1) Accounted for 21% of cases of MVP in this series. 2) Are frequently due to endocarditis. 3) Are anatomically extensive and require complex surgical procedures. 4) Have a higher rate of postoperative MR requiring reoperation than other localizations.

1012-22 Unloading Long Term Effect of Enalapril in Asymptomatic Patients With Severe Chronic Aortic Regurgitation

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Background: The renin angiotensin system may be activated in chronic aortic regurgitation (AR). Early administration of a vasodilator drug may reduce left ventricular (LV) dilation and mass expansion.

Methods: To assess the long term effect of ACE inhibition in asymptomatic patients (pt) with severe AR we compared echocardiographic left ventricular (LV) performance in 30 pt before and after 6 months. After randomization 15 pt were allocated to: enalapril (E) therapy (26 ± 6 mg/day) and 15 pt served as control (C).

Results: There were no differences in baseline Echo measurements of LV diameters, volumes, mass and mean wall stress (MWS) between E and C groups. After 6 months pt receiving E had a reduction in end-diastolic (EDD) (from 70.0 ± 8.1 to 64.6 ± 6.4 mm, p < 0.001) and end-systolic (ESD) (from 46.1 ± 8.3 to 42.0 ± 6.6 mm, p < 0.001) diameters, end-diastolic (EDVI) (from 136.6 ± 28.9 to 113.9 ± 21.9 ml/m^2, p < 0.001) and end-systolic (ESVI) (from 53.3 ± 19.6 to 42.6 ± 13.8 ml/m^2, p < 0.001) volumes, LV mass (from 214.0 ± 58.0 to 167.4 ± 37.7 g/m^2, p < 0.001) and MWS (from 370.0 ± 93.6 to 284.2 ± 53.3 kdyne/cm^2). In C group LV diameters, volumes, mass and MWS did not change after 6 months. Between E and C group it was a clear difference in EDVI (113.9 ± 21.9 vs 143.4 ± 34.4 ml/m^2, p < 0.01), ESVI (42.6 ± 13.8 vs 57.5 ± 19.6 ml/m^2, p = 0.02), LV mass (167.4 ± 37.7 vs 226.1 ± 51.5 g/m^2, p < 0.01) and MWS (284.2 ± 53.3 vs 365.9 ± 97.0 kdyne/cm^2, p < 0.01) after 6 months.

Conclusions: Long term therapy with enalapril in asymptomatic pt with severe chronic AR decreases LV size and mass and has the potential to delay timing for aortic valve replacement.

1013 Minimally Invasive Coronary Revascularization

Sunday, March 29, 1998, 5:00 p.m.–7:00 p.m.
Georgia World Congress Center, West Exhibit Hall Level
Presentation Hour: 5:00 p.m.–7:00 p.m.

1013-41 Minimal Access Aortocoronary Bypass Surgery With Endovascular Balloon Clamp: Technical Precision, Operative Times, Complications

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Background: Minimal access CABG surgery with a catheter-based system using an endovascular balloon clamp allows less invasive cardiac surgery with circulatory support and myocardial protection. Concern exists about technical difficulties, prolonged operative times, cost factors, and complications.

Methods: Between 5/96 and 1/97, 12 men and 5 women (35–74 yrs, mean 60) underwent CABG with left internal mammary to LAD coronary artery. Mini-anterior thoracotomy (6–8 cm) with single costal cartilage resection was used for access. Clinical follow-up was obtained at 2 and 6 weeks, and exercise EKG at 12 weeks. Angiocardiography was performed in the first 10 successfully completed patients to assess anastomotic quality.

Results: Three patients converted to uneventful open procedures following various technical difficulties early in the series. Precise anastomoses were achieved in the other 14 patients. Mean operative, bypass, and ischemic times for these 14 patients were 168, 36, and 16 minutes respectively. Median post-operative hospital stay was 4 days. Three patients required readmission within 2 weeks (pneumonia, wound infection, claudication after femoral cannulation), and 2 complained of abnormal chest wall movement after costal cartilage resection. All patients were angina free and had no ischemia on exercise EKG at 12 weeks. Coronary angiography in the first 10 patients showed 100% patency with no anastomotic narrowing.

Conclusions: Use of this system provided adequate cardioplegic arrest with precise, validated anastomoses. However, mini-thoracotomy and groin cannulation have separate and independent risks compared with standard sternotomy. Moreover, prolonged operative times and increased equipment costs compared with open procedures suggest that ongoing evaluation of this technique is required.

1013-42 Postoperative Outcomes of Minimally Invasive Direct Coronary Artery Bypass Surgery

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Background: Minimally invasive direct coronary artery bypass (MIDCAB) surgery is described as the grafting of the left or right internal mammary artery to the left and right anterior descending arteries, done through a limited anterior thoracotomy, without cardiopulmonary bypass pump (CPB). This prospective study was done to determine postoperative outcomes of MIDCAB grafting.

Methods: From February, 1996 to January, 1997, 102 patients underwent isolated grafting of the left or right internal mammary artery to the left or right anterior descending artery through a limited anterior thoracotomy without CPB. Mean Cleveland Clinic and modified Parsonnet Scores were 5.0 ± 2.0 and 4.8 ± 2.1, respectively, and mean preoperative ejection fraction was 42 ± 12%. The population included 7 patients converted to conventional bypass and 24 redo operations.

Results: Operative outcomes included: mortality 3.9% (4/102), myocardial infarction 3.9% (4/102), cerebrovascular accident 1.9% (2/102), atrial fibrillation 4.9% (5/102), transfusions required 9.5% (10/102), hematocrit change (−3.7 ± 4.2%), reoperation for bleeding 4.9% (5/102), with 87% (89/102) of patients extubated at the end of the operation. Twenty (20) patients, 2 of whom died prior to and 1 who refused, were randomized to have angiography and duplex doppler ultrasound at 3-month postoperatively. Angiographic patency of ≥ 1% (16/17). Mean follow-up and 19-months actuarial survival were 15 ± 3 months and 96%, respectively.

Conclusion: MIDCAB grafting can be performed safely in selected patients who otherwise would have difficulty recovering from CPB.